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TECHNICAL REPORT NO. 510-45

INITIATING EXPLOSIVES, LEAD AZIDE, LEAD STYPHNATE AND TETRACENE.

OCTOBER 1945

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TECHNICAL REPORT NO. 510-45

INITIATING EXPLOSIVES, LEAD AZIDE, LEAD STYPHNATE AND TETRACENE.

SUMMARY

This report describes the information obtained on the manufacture of initiating explosives at the DAG plant at Wolfratshausen, near Munich.

October 1945

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INITIATING EXPLOSIVES, LEAD AZIDE, LEAD STYPHNATE AND TETRACENE.

1. Introduction.

At the time of the visit (September 4, 1945) of this team to Wolfratshausen, the technical personnel were no longer in the vicinity and it was only possible to observe the plant and equipment and to obtain some information from the former plant engineer, Dr. Lindner.

While he could point out the various buildings and equipment, exact information on the chemical process constants was not available. For this reason the report on this subject prepared by L.M. Sheldon of U.S. Ordnance for CIOS (Item 2 File No. XXVII-38) should be consulted. The essential process constants have been quoted herein.

2. General Information.

Wolfratshausen was built starting in 1940 with operations going in the middle of 1941. It was built with government funds by the Dynamit A.G. controlled firm known as Verwertung Chemischer Erzengnisse G.m.b.h. The design was made to take advantage of the surrounding pine forest for camouflage. (eg. Tech. Report 267-45).

The DAG plant was essentially a detonator factory with the manufacture units for the PETN charge and also the initiating explosives i.e. Lead Azide, Lead Styphnate and Tetracene.

Raw Materials and Process constants

A. Lead Azide - per charge of 3.3 kg.

4.5 kg. Lead Nitrate as 9-10% solu.
1.5 kg. Sodium Azide as 2.7 - 3.0% solu.
150 g. Potato Dextrin dispersed in warm water
Sodium Hydroxide to make solns/alkaline.
Reaction - Temperature - 50-53°C.
Time - 1 hr.

Raw Materials and Process Constants (cont'd).

B. Lead Styphnate - per charge of 8. kgs.

86.5 liters Tri nitro resorcinol of 6° Be' solution
ca. 1 kg. Magnesium Oxide
22.7 liters Lead Nitrate of 31° Be solution (34%)
Reaction - Temperature 60°C - Time 20 to 30 min.
then cool to 25°

C. Tetracene - per charge of

40 liters Amino guanidine sulfate as 12.5% solution
50 liters Sodium Nitrite as 8% solution
Acetic Acid to neutralize
Reaction - Temperature - 50-55°C
Time - 1 to 2 hours.

The sodium Azide was obtained from Malchow or Troisdorf. The styphnic acid was obtained from Troisdorf.

3. Equipment.

The three initiating explosives were made in one building with very similar equipment. The building was made of concrete about 100 ft long and 40 ft wide. The front half of the first floor was the control operating room. It was separated from the rear half by a 24 inch thick concrete barricade. The rear half was then divided into four cells by 24 inch walls. The back wall was made of frame to serve as a blow-out wall. There was a second story of the building over the front half only. This story was divided into six rooms where the solutions of the raw materials were prepared for gravity flow to the feed bottles in the operating room (see picture No. 1)

Each cell had two precipitating-vessels (100 liter volume) made of stainless steel (see pictures No. 2) These were operated by remote control from the front room. The first cell was used for lead styphnate, the next two for lead azide and the last was for tetracene.

One raw material only was dissolved and the solution was settled to remove any grit in each room of the upper floor.

For lead azide, solutions of lead nitrate and sodium azide were

3. Equipment. (cont'd).

made in the dissolvers, (ca. 1000 liters) on the upper floor. After settling, the proper quantity was dropped by gravity to the glass bottle on the barricade wall of the first floor. The batch of the nitrate solution was dropped to the precipitator and then the azide solution was fed in over a period of one hour. The slurry was settled and the vessel was then tilted to discharge the contents to a horizontal horse hair screen supported on a wooden frame. The filtrate ran to a trough in the mastic covered floor to the killing tank set in the pit outside the building wall. Here it was treated with nitric acid and sodium nitrite to decompose the azide and then pumped to the ditch. The lead azide was washed on the filter placed in a cloth bag and transferred to the dry house. Picture No. 3 shows the drying apparatus.

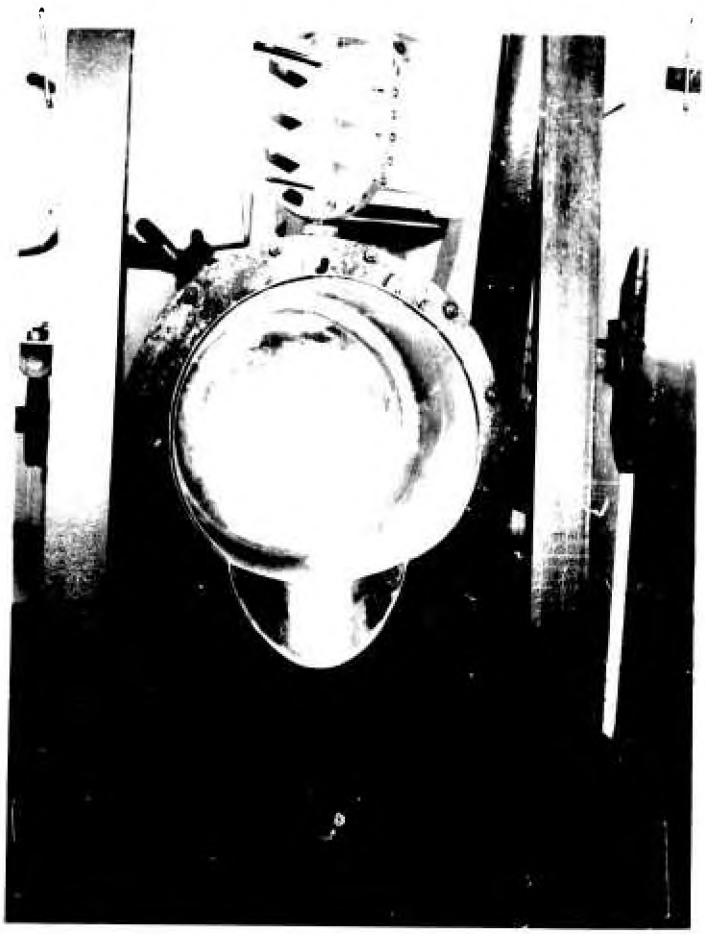
For lead styphnate, a solution of styphnic acid (trinitroresorcinol) was made and neutralized with magnesium oxide. This was cooled and settled then dropped to the measuring bottle and to the precipitator. The lead nitrate solution was then added. The charge was cooled, settled then filtered on the horse hair filter. The material was washed on the filter then sent to the dry house.

For Tetracene, the sodium nitrite solution was dropped to the kettle first and the aminoguanidine sulfate solution was added to it. The slurry was settled, decanted and filtered on a horse hair cloth.

The proper blends of these explosives were weighed in rubber cups and then blended and sieved in equipment shown in picture no. 4. These charges were then ready for loading in the detonators.

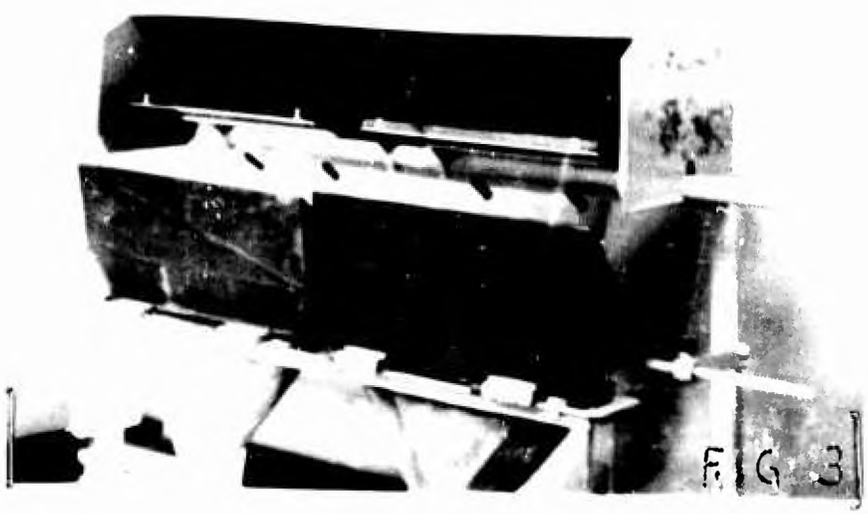
Picture No. 1

Operating and Control Room.



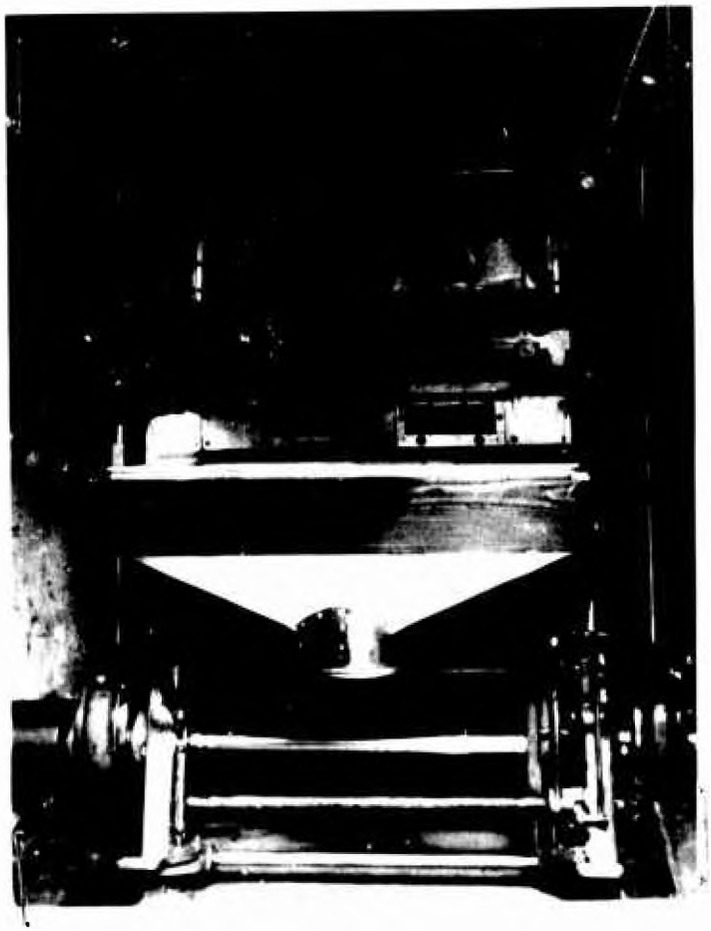
Picture No. 2

Precipitator Vessel



Picture No. 3

Dryer.



Picture No. 4

Blending and Sieving.

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